

# PATENT ABSTRACTS OF JAPAN

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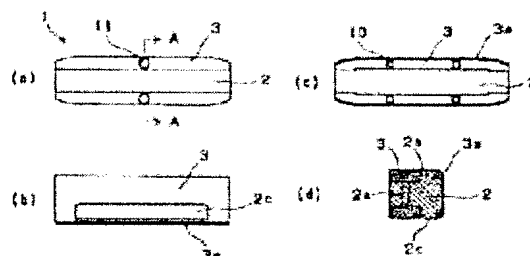
(72)Inventor : KAKEHI KOZO

## (54) SLIDE KEY AND CONTINUOUSLY VARIABLE TRANSMISSION

(57)Abstract:

PROBLEM TO BE SOLVED: To perform force fitting or fitting without biting when the slide key is mounted to a groove of a rotating shaft.

SOLUTION: This slide key is used for engaging a slide cylinder in the axial direction of the rotating shaft slidably and follow rotatably, and is a complex integrated molded article of a metal molded body and a resin body. A corner part of a slide key bottom fitting with the groove part formed in the outer periphery of the rotating shaft is formed on the resin body longitudinally.



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CLAIMS

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[Claim(s)]

[Claim 1]slidable to shaft orientations of the axis of rotation, and flattery -- it is a sliding key engaged in a sliding cylinder pivotable, and this sliding key is a compound integrally molded product of a metal-forming object and a resin body.

And a sliding key characterized by a sliding-key pars basilaris ossis occipitalis which fits into a slot established in a peripheral part of said axis of rotation ending, and coming to form a part by said resin body over a longitudinal direction.

[Claim 2]The sliding key according to claim 1, wherein said resin body consists of a resin composition in which injection molding is possible.

[Claim 3]The sliding key according to claim 2, wherein the remains of an ejection pin at the time of injection molding are formed in a resin part of said bottom.

[Claim 4]The axis of rotation which a slot is formed [ axis of rotation ] in a peripheral part and made a sliding key fit into this slot, and a fast pulley which really rotates, A nonstep variable speed gear, wherein it is a nonstep variable speed gear which has the movable pulley provided with a sliding cylinder which a slot which has the width of a circumferencial direction by which said sliding key is received, and extends to shaft orientations was made equivalent to a slot of a peripheral part of said axis of rotation, and was formed in an inner periphery and said sliding key is the sliding key according to claim 1.

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## DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention]This invention relates to the sliding key which consists of a compound integrally molded product of a metal-forming object and a resin body suitable for using it under particular status environment, such as elevated-temperature non-lubrication, and the nonstep variable speed gear using the sliding key.

[0002]

[Description of the Prior Art]The pulley structure of the nonstep variable speed gear engaged by a sliding key as a pulley structure of the nonstep variable speed gear using a sliding key in the axis of rotation, the fast pulley which really rotates, and the movable pulley provided with the sliding cylinder is known (JP,H8-219258,A). Drawing 4 and drawing 5 explain a conventional pulley structure and sliding key of a nonstep variable speed gear. Drawing 4 shows the shaft-orientations half section figure of pulley structure, and drawing 5 shows the shape of a sliding key, respectively. The axis of rotation 4 rotated with the engine which omitted the graphic display is supported movably by the bearings 5a and 5b by the main part 6 of a gearbox. In the step 4a which it projects to the axis of rotation 4 at the method of outside at integral form, and the fast pulley 7 is formed, and was formed in the periphery of the axis of rotation 4, it dents in the shape of a long hole on the periphery at a longitudinal direction, and the slot 4b is formed by circumferencial direction regular intervals. The sliding key 1 fits into this slot 4b, and the movable pulley 8 which has the slidable sliding cylinder 8a so that \*\*\*\*\* may become possible to the fast pulley 7 by this sliding key 1 is being engaged. As for the reciprocating-movement function of shaft orientations, the sliding key 1 which fits into the slot 4b is mainly further required as an option as a baffle or an object for transmitting power. In drawing 4, 9 is the V belt hung between the fast pulley 7 and the movable pulley 8.

[0003]Conventionally, the sliding key of the compound integrally molded product of a metal-forming object and a resin body is known as the sliding key 1 (JP,2000-55067,A). An example of this sliding key is shown in drawing 5. Drawing 5 (a) shows the top view of a sliding key, drawing 5 (b) shows a front view, and drawing 5 (c) shows the D-D sectional view of the (a) figure, respectively. The sliding key 1 consists of the metal-forming object 2 and the resin body 3. Integral moulding of the resin body 3 is carried out to the metal-forming object 2.

The part of the sliding key made to fit into the slot 4b formed in the periphery of the step 4a of the axis of rotation shown in drawing 4 is the metal-forming object 2, and the inner circumference slot of the sliding cylinder 8a and the part on which it slides are the resin bodies 3. By using a fitting part as the metal-forming object 2, the fitting force of the sliding key 1 improves and the slidability of the sliding cylinder 8a and the axis of rotation 4 improves by using a sliding part as the resin body 3.

[0004]On the other hand, in order to make the slot 4b carry out press fitting of the fitting part of the sliding key 1, a pars basilaris ossis occipitalis ends and it is performing chamfering work in the part 3e. If chamfering work is not performed, when carrying out press fitting to the slot 4b, problems, like gnaw, it fits in aslant, or a fitting step takes time arise.

[0005]

[Problem(s) to be Solved by the Invention]However, although polishing work or milling is performing chamfering work of the above-mentioned finishing part 3e, there is a problem of that productivity falls since the number of processes of operation increases, a manufacturing cost rising. The problem that rust occurs is in the processing part by machining the metal-forming object 2 which performed surface treatments, such as plating.

[0006]This invention was made in order to cope with such a problem, and it aims at offer of press fitting or the sliding key which can fit in, and the nonstep variable speed gear using the sliding key, without gnawing, when equipping a slot.

[0007]

[Means for Solving the Problem]that a sliding key of this invention is slidable to shaft orientations of the axis of rotation, and flattery --- pivotable, it is an engaged sliding key and this sliding key a sliding cylinder, A sliding-key pars basilaris ossis occipitalis which is a compound integrally molded product of a metal-forming object and a resin body, and fits into a slot established in a peripheral part of the above-mentioned axis of rotation ends, and it comes to form a part by the above-mentioned resin body over a longitudinal direction. The above-mentioned resin body consists of a resin composition in which injection molding is possible. The remains of an ejection pin at the time of injection molding are formed in a resin part of the bottom which fits in to a slot established in the axis of rotation.

[0008]The axis of rotation in which a slot is formed in a peripheral part and a nonstep variable speed gear of this invention made a sliding key fit into this slot, and a fast pulley which really rotates, It has the movable pulley provided with a sliding cylinder which a slot which has the width of a circumferencial direction by which the above-mentioned sliding key is received, and extends to shaft orientations was made equivalent to a slot of a peripheral part of the above-mentioned axis of rotation, and was formed in an inner periphery, and the above-mentioned sliding key is characterized by being an above-mentioned sliding key.

[0009]When a sliding-key pars basilaris ossis occipitalis which fits in to a slot which a sliding key of this invention is an integrally molded product of a metal-forming object and a resin body, and was established in a peripheral part of the axis of rotation ends and a part forms by the above-mentioned resin body over a longitudinal direction, Since it begins to contact from a resin part to a slot when carrying out press fitting to a slot, it can press fit without a galling phenomenon etc. arising. Also when fitting in, breakage of a resin body finishing part does not arise by living in a sliding-key pars basilaris ossis occipitalis, and providing a part. Since chamfering work of a post process becomes unnecessary by [ used as a chamfer ] ending and using a part as mold goods of a resin body, productivity improves and rust does not occur.

[0010]Since an above-mentioned sliding key is used for a nonstep variable speed gear of this invention, an assembly is easy, and a nonstep variable speed gear which has smooth operation performance in-less lubricous atmosphere is obtained.

[0011]

[Embodiment of the Invention]Drawing 1 explains the sliding key of this invention. Drawing 1 (a) shows an A-A sectional view [ in / drawing 1 (c) can set the top view of a sliding key, and drawing 1 (b) in a front view, can be set in a bottom view, and / in drawing 1 (d) / the (a) figure ], respectively. The sliding key 1 consists of the metal-forming object 2 and the resin body 3, and the resin body 3 is formed of the metal-forming object 2 and integral moulding. The shape of the sliding key 1 should just be shape which is shown in drawing 3 mentioned later and which can carry out press fitting to the slot 4b formed in the periphery of the step 4a of the axis of rotation, and does not shift to a radial load. As for the part which carries out press fitting to the slot 4b, it is preferred that it is the shape from which the most serves as the metal-forming object 2, and the inner circumference slot of the sliding cylinder 8a and the part on which it slides serve as the resin body 3. By using most press fitting parts as the metal-forming object 2, the fitting force of the sliding key 1 improves and the slidability of the sliding cylinder 8a and the axis of rotation 4 improves by using a sliding part as the resin body 3.

[0012]A machining article, a forging, a ROSUTO wax article, a sintered-metal article, a metal injection article, etc. can be used for the metal-forming object 2. A ROSUTO wax article and a sintered-metal article are preferred for the Reasons of intensity reliability, cost, etc. also in

these. In order to prevent surface rust, surface treatments, such as plating, can be carried out. [0013]When integral moulding of the shape of the metal-forming object 2 is carried out, it is preferred that the resin body 3 and the metal-forming object 2 are shape inseparable during a nonstep variable speed gear operation. As shown in drawing 1 (d), specifically, a slot and the breakthrough 2a are formed in the metal-forming object 2. Since this slot and breakthrough 2a are filled up with the resin body 3 by this breakthrough 2a in the case of integral moulding and it becomes a complex of a resin composition and metal, the sliding key 1 of this invention serves as a firm integrally molded product, without using adhesives etc.

[0014]As the longitudinal direction finishing part 3a of a sliding-key pars basilaris ossis occipitalis serves as the resin body 3, the sectional shape of the metal-forming object 2 is the shape where the pars-basilaris-ossis-occipitalis side which is cross shape and forms the longitudinal direction finishing part 3a ended, and part 2b was dented inside (drawing 1 (d)). It is preferred that it is a size required for the shape where it dented inside to end, for part 2b end at the time of injection molding, and for resin flow into the part 3a, and when carrying out press fitting of the sliding key to the slot 4b of the axis of rotation, it is preferred to have the flank part 2c of the metal-forming object of sufficient size from which it does not incline or escape. It ends and, as for part 2b, specifically, it is preferred that it is a size which it ends and the base part of the sliding key 1 and a part of lateral portion can form by the resin body 3 including the sloping part of the part 3a. Although it changes also with resin bodies 3 used, In [ case of the thermoplastic polyimide mentioned later and the resin which uses polyether ketone system resin as the main ingredients ] drawing 1 (d), one side ends [ bottom length x side length ] to mm(5-15) x(5-15) mm -- part 2b -- \*\* of the bottom and the side -- finishing -- it is preferred that it is mm (0.5-3.0). In not requiring press fitting, the longitudinal direction finishing part 3a of a sliding-key pars basilaris ossis occipitalis can do the part with the resin body 3.

[0015]It can be used if it is the metal-forming object 2 and a resin composition which can carry out integral moulding, and as for the resin composition which forms the resin body 3, the forming process can also use injection molding, compression molding, transfer moulding, etc. The resin composition which can carry out injection molding in these is preferred. It is because integral moulding can be easily carried out even if the metal-forming object 2 is complicated shape. As a resinous principle which can carry out injection molding, polyether ketone system resin, such as thermoplastic polyimide, polyether ether ketone resin, and polyether ketone resin, Polyacetal resin, polyamide resin, polyethylene resin, polyamide imide resin, a polyether nitrile resin, aromatic polyester resin, polyphenylene sulfide resin, etc. can be illustrated. These can be used even if it is the polymer alloy and polymer blend which consist of resin beyond 2 sort, even when it is independent.

[0016]The thermoplastic polyimide which can obtain the sliding key which was excellent in a mechanical strength and slidability also in these, and the resin which uses polyether ketone system resin as the main ingredients are preferred. As thermoplastic polyimide, the trade name PEK220G grade of trade name PEEK150P by the Victrex MC company and the product made by ICI is mentioned for trade name ORAMU by Mitsui Chemicals, Inc., etc. as polyether ketone system resin again, respectively.

[0017]In the resin composition which constitutes the resin body 3, tetrafluoroethylene resin, Various fillers, such as reinforcing members, such as solid lubricants, such as black lead, molybdenum disulfide, a tungsten disulfide, graphite fluoride, boron nitride, and silicon nitride, glass fiber, carbon fiber, and whiskers, calcium carbonate, clay, and mica, etc. can be blended.

[0018]The injection molding method concerning this invention is acquired by carrying out injection fill of the resin composition in the metallic mold with which the metal-forming object 2 has been arranged. depending on the shape of the metal-forming object 2, two or more number of gates may be boiled, and may be carried out -- an one-point gate system or a multipoint gate system is employable. For example, the sliding key shown in drawing 1 shows the example using two-point gate system with which 11 remains in 2 gate marks. The sliding key 1 by which integral moulding was carried out is taken out from a metallic mold with an ejection pin from the field of a gate and an opposite hand. By arranging the position of an ejection pin in the position used as a resin part at the bottom, since it is taken out from a metallic mold, without the metal-forming

object 2 and the resin body 3 separating, productivity improves. Thereby, the remains 10 of an ejection pin at the time of injection molding are formed in the resin part of the bottom of the sliding key 1.

[0019]The nonstep variable speed gear of this invention is characterized by using the above-mentioned sliding key 1. By using the above-mentioned sliding key 1, the nonstep variable speed gear of low cost is obtained by a small light weight of a simple structure. The condition of use of the sliding key 1 is shown in drawing 2. Drawing 2 is a figure showing the axis of rotation into which the sliding key was made to fit, and, as for drawing 2 (a), drawing 2 (b) shows the perspective view of the step 4a of the axis of rotation, a sliding key, and press fitting or the sectional view at the time of making it fit in, respectively. In drawing 2 (a), in the step 4a formed in the periphery of the axis of rotation, it dents in the shape of a long hole on the periphery at a longitudinal direction, and the slot 4b is formed. The slot 4b is at least. It is preferred to form several places in circumferencial direction regular intervals preferably one place. The sliding key 1 fits into this slot 4b, and the sliding cylinder is being engaged slidably (drawing 2 (b)). Press fitting was able to be carried out without galling of the sliding key 1 arising, when the above-mentioned sliding key 1 was used for the sliding key, the conventional component which shows drawing 4 other components was adopted and the nonstep variable speed gear was assembled. A nonstep variable speed gear is temperature abbreviation. 120 \*\*, load abbreviation 250kgf, sliding speed Neither seizure nor destruction was produced under a 1.4 mm/sec operating environment.

[0020]The shape where it dented inside ends and part 2b shows drawing 3 the example formed only in the sloping part of the longitudinal direction finishing part 3a of a sliding-key pars basilaris ossis occipitalis as a comparative example. A C-C expanded sectional view [ in / drawing 3 / (a) / drawing 3 (c) ] can set the top view of a sliding key and drawing 3 (b) in a front view, can be set in a bottom view, and / in drawing 3 (d) / the (a) figure ] and drawing 3 (e) show the B-B expanded sectional view in the (a) figure, respectively. The shape where it dented inside ends, if part 2b is small, the flow of resin will become difficult at the time of injection molding, a sliding-key pars basilaris ossis occipitalis ends, and the whole part cannot be filled up with resin. That is, the portion 3c with which resin was filled up, and 3 d of portions with which it does not fill up arise (drawing 3 (b), (c)). The portion in which the pars basilaris ossis occipitalis by a resin body lives as a result, and a part is not formed arises (drawing 3 (e)). The metal-forming object 2 ends, when a part serves as acute angle shape and carries out press fitting of 3 d of the portions with which resin is not filled up to a slot, they are gnawed, and a phenomenon etc. produce them. Resin body 3 portion which the sliding-key pars basilaris ossis occipitalis ended, and was formed in the part becomes thin, and since it is not united, the adhesion of the metal-forming object 2 and the resin body 3 falls.

[0021]

[Effect of the Invention]without it gnaws when equipping a slot since it comes to form the longitudinal direction finishing part of the sliding-key pars basilaris ossis occipitalis which the sliding key of this invention is a compound integrally molded product of a metal-forming object and a resin body, and fits in to the slot established in the peripheral part of the axis of rotation by the above-mentioned resin body — press fitting — or it can fit in. Since the chamfering work of a post process becomes unnecessary, productivity improves. Since rust does not occur, it excels in endurance.

[0022]Since a resin body consists of a resin composition in which injection molding is possible, compound integral moulding can be easily carried out to a complicated-shaped metal-forming object. As a result, it excels in a mechanical property and a low cost sliding key is obtained.

[0023]Since the remains of an ejection pin at the time of injection molding are formed in the resin part of the bottom which fits in to the slot established in the axis of rotation, even if it is a complicated-shaped compound integrally molded product, it excels in the adhesion of a resin body and a metal-forming object.

[0024]It becomes it is easy to attach and possible [ a simple structure ] for it, since an above-mentioned sliding key is used for the nonstep variable speed gear of this invention, and the nonstep variable speed gear of low cost is obtained by a small light weight.

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DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1]It is a figure showing an example of a sliding key.

[Drawing 2]It is a figure showing the axis of rotation into which the sliding key was made to fit.

[Drawing 3]It is a figure showing an example of the sliding key shown as a comparative example.

[Drawing 4]It is a shaft-orientations half section figure of pulley structure.

[Drawing 5]It is a figure showing the conventional sliding key.

[Description of Notations]

- 1 Sliding key
- 2 Metal-forming object
- 3 Resin body
- 4 Axis of rotation
- 5 Bearing
- 6 The main part of a gearbox
- 7 Fast pulley
- 8 Movable pulley
- 9 V belt
- 10 The remains of an ejection pin
- 11 Gate mark

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[Translation done.]



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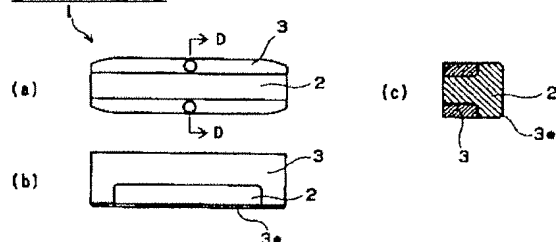
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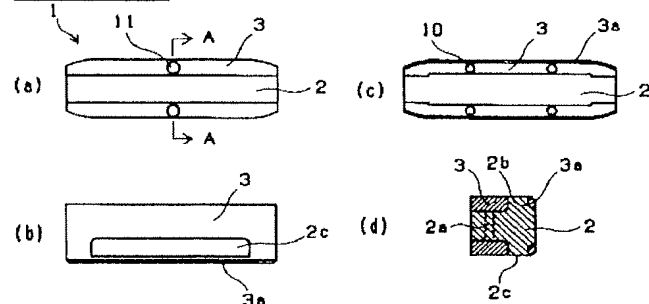
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## DRAWINGS

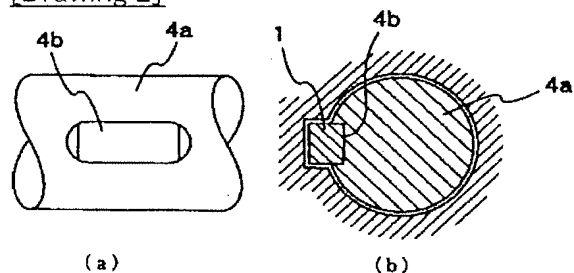
[Drawing 5]



[Drawing 1]

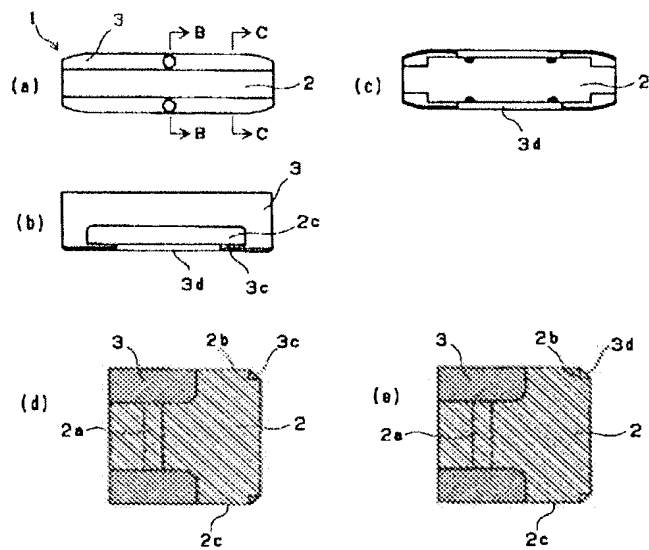


[Drawing 2]

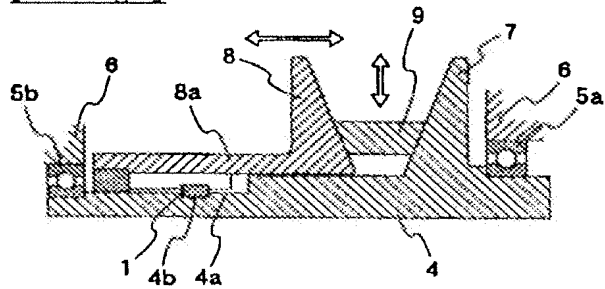


[Drawing 3]





[Drawing 4]



[Translation done.]